



# IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Patentee: Shen et al.

Assignee: Atwood Mobile Products, Inc.

Reissue Application No.: 10/621,999 Date Filed: July 17, 2003

U.S. Patent No.: 5,573,648 Date Issued: November 12, 1996

Application No.: 381,718 Date Filed: January 31, 1995

Title: **GAS SENSOR BASED ON PROTONIC CONDUCTIVE  
MEMBRANES**

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Commissioner for Patents  
P.O. Box. 1450  
Alexandria, VA 22313-1450

## REISSUE APPLICATION DECLARATION BY MARCHIANDO

Dear Sir:

I, Keith Marchiando, hereby declare that:

1. As established by the Certificate Under 37 C.F.R. § 3.73(b) previously filed in the application: (i) Atwood Industries, Inc., as assignee from the named inventor, made a capital contribution of all its assets to Atwood RV Products, Inc., and (ii) Atwood RV Products, Inc. merged with two other companies and subsequently changed its name to Atwood Mobile Products, Inc. Dura Automotive Systems, Inc. is authorized to act on behalf of Atwood Mobile Products, Inc. I am authorized to act on behalf of Dura

*Reissue Application Declaration by Marchiando*  
*Reissue Application No. 10/621,999*  
*Reissue Application of U.S. Patent No. 5,573,648*  
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Automotive Systems, Inc., and the title of my position with Dura Automotive Systems, Inc., is Vice President and Chief Financial Officer.

2. This declaration is being filed to complete the requirements for filing a reissue application for the above-referenced patent. I understand that the assignee of entire interest is authorized to make this declaration for reissue application under 37 C.F.R. § 1.172(a) because the reissue application is not seeking to enlarge the scope of the claims.

3. I believe the inventors to be the original and first inventors of the subject matter that is described and claimed in the above-referenced patent, for which a reissue patent is sought on the invention referenced above.

4. A copy of the specification, figures, abstract and claims of U.S. Patent No. 5,573,648 is attached hereto.

5. I have reviewed and understand the contents of the specification, figures, abstract and claims of the above-referenced patent and the claims presented in the preliminary amendment filed with this declaration.

6. A chart showing the differences in claim language between the original patent claims and claims 79-88 presented in the reissue application has previously been submitted in this application and is incorporated here by reference.

7. I acknowledge the duty to disclose information that is material to patentability as defined in 37 C.F.R. § 1.56.

8. I verily believe the original patent to be wholly or partly inoperative or invalid by reason of the patentee claiming less than he had the right to claim in the patent, as follows:

A) Patentee failed to claim a two-electrode electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

B) Patentee also failed to claim an electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting

material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

C) Patentee also failed to claim a two-electrode electrochemical gas sensor for quantitative measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas,

said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

D) Patentee also failed to claim an electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

E) Patentee also failed to claim an electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte

membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane and the sensing electrode and the counter

electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

F) Patentee also failed to claim an electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane and the sensing electrode reacting with the gas in the absence of an applied voltage to the sensing electrode.; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the

range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

G) Patentee also failed to claim an electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising: a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm, the sensing electrode and the counter electrode being on opposite sides of the first protonic conductive electrolyte membrane, the sensing electrode and the counter electrode being the only two electrodes in contact with the first protonic conductive electrolyte membrane, and the sensing electrode reacting with the gas in the absence of an applied voltage to the sensing electrode; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic. Such error arose without any deceptive intention on the part of the patentee.

H) Patentee also failed to claim non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage. Such error arose without any deceptive intention on the part of the patentee.

I) Patentee also failed to claim non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode, in which the sensing electrode and the counter electrode are the only two electrodes in contact with the first



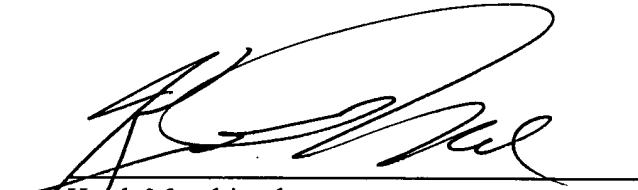
protonic conductive electrolyte membrane; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage. Such error arose without any deceptive intention on the part of the patentee.

J) Patentee also failed to claim non-biased electrochemical gas sensor for measurement of a gas in an ambient atmosphere comprising a porous mixed ionic-electronic conductive sensing electrode having both an electronic conducting material and an ionic conducting material; a porous mixed ionic-electronic conductive counter electrode having both an electronic conducting material and an ionic conducting material; a first protonic conductive electrolyte membrane in between and in contact with the sensing and counter electrodes, and having a thickness in the range of approximately 0.1 mm to 1 mm; the sensing electrode reacting with the gas to produce a change in an electrical characteristic between the sensing electrode and the counter electrode, in which the sensing electrode reacts with the gas to produce a change in electrical characteristic between the sensing electrode and the counter electrode in the absence of an applied voltage to the sensing electrode; means for electrical measurement; said sensing and counter electrodes each having a diameter in the range of approximately 1 mm to 15 mm, and being electrically connected to said electrical measurement means; whereby, in a positive ambient concentration of said gas, said electrical measurement means detects changes in said electrical characteristic in the absence of any biasing voltage. Such error arose without any deceptive intention on the part of the patentee.

9. All errors corrected in the reissue application arose without deceptive intention on the part of the Applicant.

10. The oath or declaration did not comply with 37 C.F.R. § 1.63 in that it did not identify the residence (e.g. city and either state or foreign country) of each inventor and did not identify the citizenship of each inventor. U.S. PTO form PTO/SB/52 (03-02) is enclosed as Attachment A.

11. All statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under 18 U.S.C. § 1001 and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.



Keith Marchiando  
Vice President and Chief Financial Officer  
Dura Automotive Systems, Inc.

## **ATTACHMENT A**